



SAINT-GOBAIN NORPRO

ENGINEERED CERAMIC MATERIALS

DENSTONE[®]
SUPPORT MEDIA



THE INDUSTRY REFERENCE FOR DECADES

Today, Saint-Gobain NorPro offers Denstone® 57, 2000 and 99 support balls along with Denstone® deltaP® shaped support media. Denstone bed support media is the optimum choice for reliable, worry-free operation.



At Saint-Gobain NorPro, we understand the significant investment you have in your reactor catalyst.

Only an exceptional bed support media will allow your catalyst to achieve optimum performance and service life. Our Denstone® support media is made under ISO-certified processes to provide you with a consistent, reliable product. This gives you the peace of mind that your catalyst is safe from the common problems of chips, splits, spalls, cracks and dust associated with low-quality support media. You can trust that the monolithic structure of Denstone® support media will stand up to your most severe processes.

Denstone® ceramic bed support was first introduced over 70 years ago to address the need for an inert support media that would retain the catalyst in fixed bed reactors without contaminating the process. The product line became synonymous with quality and structural integrity as Denstone® 57, the most widely used support media in the world, set the stage as the industry standard.

Read More: [www.norpro.saint-gobain.com/
support-media](http://www.norpro.saint-gobain.com/support-media)

Saint-Gobain is a world leader in high-performance materials with over 350 years of ceramic manufacturing history. And for the last 70 years, Saint-Gobain NorPro has been making ceramics for the refining, chemical, petrochemical and natural gas processing industries. In Saint-Gobain NorPro, you have a strong and reliable partner with a unique combination of experience and knowledge in ceramic manufacturing.

THE ULTIMATE PERFORMANCE ENHANCER

Denstone® deltaP® media boosts reactor performance and reduces fill costs with fewer layers.

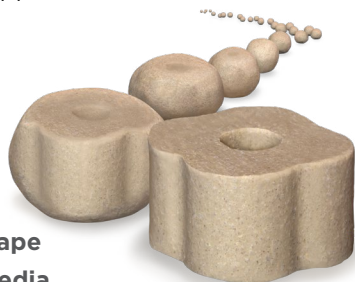
Its unique shape reduces layering to minimize support media needs and frees up valuable space for catalyst — the workhorse of the reactor.

More catalyst capacity delivers huge performance advantages through increased throughput, lifetime, rate and profits.



The Evolution of Support Media

Bed support media made a leap from gravel to spheres long ago, but it wasn't until Denstone® deltaP® that support media truly emerged. The shape of Denstone deltaP media was designed from the ground up to **boost reactor performance**, and not just focus on support media itself.



The evolution of the shape of Denstone® deltaP® media

DENSTONE®

Reshaping How You Think About Support Media

CERAMIC BED SUPPORT SOLUTIONS



Denstone® deltaP® Support Media

Denstone® deltaP® engineered bed support has been delivering an advantage over traditional support balls for over ten years. With chemistry and quality like that of Denstone® 57 and 2000 inert ceramic balls, the unique shape of Denstone deltaP media allows you to achieve more with less. [Read More: www.norpro.saint-gobain.com/support-media/denstone-deltap](http://www.norpro.saint-gobain.com/support-media/denstone-deltap)

No more than two layers of Denstone® deltaP® media are required to retain even the smallest catalyst sizes, versus as many as four layers of support balls. This eliminates the need for costly small spheres, simplifies layering configurations, reduces unit pressure drop and can increase the available space inside your reactor. If used for more catalyst capacity, that additional space can mean increased throughput, longer service life and greater profits.

Denstone® deltaP® Support Media Typical Properties

Physical Properties

Size (Designation)	Typical Diameter		Crush Strength		Bulk Density*	
			(lb)	(kg)		
	(in)	(mm)	min	min	(kg/m³)	(lb/ft³)
P1	0.45	11.5	500	227	1170	73
P1.4	0.69	17.4	750	340	1170	73
P2	1.22	31.0	1500	680	1120	70

* Average bulk density will vary based on manufacturing location

Chemical Properties

	min %	max %
SiO ₂	67.0	77.0
Al ₂ O ₃	18.0	26.0
Fe ₂ O ₃	-	1.7
TiO ₂	-	1.5
CaO	-	1.0
MgO	-	1.0
Na ₂ O	-	2.0
K ₂ O	-	6.0
Al ₂ O ₃ + SiO ₂	90.0	96.0

Other Properties

Leachable Iron	≤ 0.1%
Water Absorption	≤ 6.0%
Max Operating Temperature	1000 °C
MOHS Hardness	> 6.5



Denstone® 2000 Support Balls

Denstone® 2000 ceramic support balls were designed for severe hydroprocessing applications where support media may be subject to rapid depressurization and thermal shock. The engineered microstructure of Denstone 2000 media exhibits unprecedented survivability in these applications. To verify that every single production batch of Denstone 2000 media can survive a rapid depressurization, Saint-Gobain NorPro originated one of the most rigorous tests in the industry.

Read More: www.norpro.saint-gobain.com/support-media/denstone-2000

Denstone® 2000 catalyst support balls also offer superior impact resistance and compressive strength. This resilience safeguards against plugging and fouling of the catalyst due to fracture of the support media in severe services.

Denstone® 2000 Support Balls Typical Properties

Physical Properties

Nominal Size		Crush Strength		Bulk Density*			
		(lb)	(kg)	(kg/m ³)		(lb/ft ³)	
mm	in	min	min	min	max	min	max
3	1/8	50	22.7	1281	1378	80	86
6	1/4	160	72.5	1281	1378	80	86
10	3/8	250	113	1281	1378	80	86
13	1/2	500	227	1281	1378	80	86
16	5/8	600	273	1281	1378	80	86
19	3/4	1050	477	1281	1378	80	86
25	1	1750	795	1281	1378	80	86
32	1-1/4	2000	900	1281	1378	80	86
38	1-1/2	2000	900	1281	1378	80	86
50	2	2000	900	1281	1378	80	86

* Average bulk density will vary based on manufacturing location

Chemical Properties

	min %	max %
SiO ₂	67.0	77.0
Al ₂ O ₃	18.0	26.0
Fe ₂ O ₃	-	1.7
TiO ₂	-	1.5
CaO	-	1.0
MgO	0	1.0
Na ₂ O	0	2.0
K ₂ O	-	6.0
Al ₂ O ₃ + SiO ₂	90.0	96.0

Other Properties

Leachable Iron	≤ 0.1%
Sphericity	< 1.25
Max Operating Temperature	1000 °C
MOHS Hardness	> 6.5
Attrition (weight loss)	≤ 1.0%
Water Absorption	2.0 - 6.0%



Denstone® 57 Support Balls

Denstone® 57 ceramic support balls are the industry standard in bed support media and have been for over 70 years. This high quality support media is free of catalytic poisons and has a maximum resistance to attrition. Denstone 57 inert support balls retain their physical properties after thermal cycling; their dependable structure prevents fouling and plugging of the catalyst bed.

Read More: www.norpro.saint-gobain.com/support-media/denstone-57

Denstone® 57 Support Balls Typical Properties

Physical Properties

Nominal Size		Crush Strength		Bulk Density*			
		(lb)	(kg)	(kg/m ³)		(lb/ft ³)	
mm	in	min	min	min	max	min	max
3	1/8	50	22.7	1282	1426	80	89
6	1/4	120	55	1282	1426	80	89
10	3/8	200	90	1282	1426	80	89
13	1/2	370	170	1282	1426	80	89
16	5/8	500	230	1282	1426	80	89
19	3/4	950	430	1250	1394	78	87
25	1	1400	635	1250	1394	78	87
32	1-1/4	2000	900	1250	1394	78	87
38	1-1/2	2000	900	1250	1394	78	87
50	2	2000	900	1250	1394	78	87

* Average bulk density will vary based on manufacturing location

Chemical Properties

	min %	max %
SiO ₂	64.0	75.0
Al ₂ O ₃	19.0	26.0
Fe ₂ O ₃	-	1.7
TiO ₂	-	1.5
CaO	-	0.7
MgO	-	0.5
Na ₂ O	-	2.9
K ₂ O	-	4.8
Al ₂ O ₃ + SiO ₂	90.0	96.0

Other Properties

Leachable Iron	≤ 0.1%
Sphericity	< 1.25
Max Operating Temperature	1000 °C
MOHS Hardness	> 6.5
Attrition (weight loss)	≤ 1.0%
Water Absorption	
diam ≥ 10 mm	≤ 0.4%
diam = 6 mm	≤ 1.0%
diam = 3 mm	≤ 3.0%

DENSTONE®

Support Media: Reliability. Delivered.

With its long-standing reputation, Denstone® media continues to set the standard for technical and manufacturing excellence in catalyst bed support media. Through decades of serving the hydrocarbon processing industry, Saint-Gobain NorPro has created a family of Denstone media that allows you to focus on your process and not on your support media. When you need reliable bed support, choose Denstone support media.



Denstone® 99 Support Balls

Denstone® 99 high purity alumina support balls are designed for high-temperature steam applications, as found in synthesis gas production. Composed of over 99% alpha alumina with a maximum silica content of only 0.2%, it addresses concerns of leached silica, protecting your catalyst bed and downstream equipment.

Denstone® 99 media is also preferred in reactive olefin processes where a chemically resistant support media is required to avoid polymerization. Its ability to withstand extreme temperatures also makes it a good choice for heat retention or equilibration media.

Read More: www.norpro.saint-gobain.com/support-media/denstone-99

Denstone® 99 Support Balls Typical Properties

Physical Properties

Nominal Size		Crush Strength		Bulk Density			
		(lb)	(kg)	(kg/m³)		(lb/ft³)	
mm	in	min	min	min	max	min	max
1.5	1/16	30	13	1682	2050	105	128
3	1/8	110	50	1850	2050	115	128
6	1/4	220	100	1850	2050	115	128
8	5/16	330	150	1850	2050	115	128
10	3/8	440	200	1850	2050	115	128
13	1/2	1322	600	1850	2050	115	128
19	3/4	2202	1000	1800	2050	112	128
25	1	3083	1400	1762	2050	110	128
38	1-1/2	3965	1800	1682	2002	105	125
50	2	4846	2200	1682	2002	105	125
75	3	4846	2200	1682	2002	105	125

Chemical Properties

	min %	max %
SiO ₂	-	0.2
Al ₂ O ₃	99.0	-
Fe ₂ O ₃	-	0.2
TiO ₂	-	0.5
CaO+ MgO	-	0.2
Na ₂ O + K ₂ O	-	0.4
Al ₂ O ₃ + SiO ₂	99.2	-

Other Properties

Leachable Iron	≤ 0.01%
Sphericity	< 1.10%
Max Operating Temperature	1650°C
Attrition (weight loss)	≤ 0.5%
Water Absorption	≤ 7.0%

NORPRO

SAINT-GOBAIN



Denstone® Support Media: Designed for Consistency

With each of our three ISO certified global manufacturing sites, Saint-Gobain NorPro builds consistency, quality and reliability into every step of Denstone® media production. That's why you can be confident of getting the same exceptional product with the same rigorous specifications from each of our manufacturing sites worldwide.

We qualify all of our raw material sources and perform quality testing on our raw materials before approving them for production.

Our robust manufacturing processes, supported by Saint-Gobain NorPro's Operational Excellence programs, build quality and reliability into each manufacturing step. From mixing to forming to firing, we tightly control our manufacturing with in-process quality checks and state-of-the-art equipment. Most critically, our manufacturing processes give Denstone® support media the uniform structure and controlled porosity that deliver optimal survivability and resistance to chipping in service. Products made using inferior methods or lacking Saint-Gobain NorPro's rigorous process controls are often deficient in piece-to-piece consistency, making them far less reliable in use.

Before our products are released for shipment, we conduct rigorous and comprehensive standardized in-house testing so you can have confidence that you are getting quality and reliability each and every time.

DENSTONE®
SUPPORT MEDIA



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The information herein does not constitute a guarantee or warranty. Saint-Gobain NorPro's warranty is set forth in its standard terms and conditions which govern sales of Saint-Gobain NorPro products. The standard terms are set forth in Saint-Gobain NorPro quotations and acknowledgments and are also available upon request.